CSIRO PUBLISHING

Australian Mammalogy
https://doi.org/10.1071/AM17053

Research Note

Did *Zaglossus bruijnii* occur in the Kimberley region of Western Australia?

Andrew A. Burbidge

87 Rosedale Street, Floreat, WA 6014, Australia. Email: amburbidge@westnet.com.au

Abstract. A 2012 paper reported the discovery of a specimen of *Zaglossus bruijnii* with a label attached that recorded that it had been collected at Mount Anderson, in the south-west Kimberley region of Western Australia, in 1901. Based on several lines of evidence, I argue that this distinctive long-beaked echidna is not, and has not been, part of the Kimberley region's modern mammal fauna. The simplest and most plausible explanation is that the tag on the specimen came from another animal.

Received 15 November 2017, accepted 26 November 2017, published online 21 December 2017

Introduction

Helgen *et al*. (2012) reported a previously overlooked museum specimen (skin and skull), now in the Natural History Museum, London, of *Zaglossus bruijnii*, the western long-beaked echidna, labelled as having been collected by John T. Tunney in 'conglomerate hills' at Mount Anderson in the south-western Kimberley region of Western Australia, in 1901. No previous or recent modern records of the species are known from Australia, suggesting yet another recently extinct Australian mammal (Woinarski *et al*. 2014). The authors concluded '*Zaglossus* is part of the modern fauna of the Kimberley region of Western Australia, where it apparently survived as a rare element into the twentieth century, and may still survive' (p. 109).

Towards the end of the paper, Helgen *et al*. state 'We suggest that future efforts to investigate the recent survival of *Zaglossus* in remote northern Australia take into account evidence that may be derived from cultural sources such as rock art, living memories from Aboriginal cultures, and examination of vocabularies relevant to animal names in Aboriginal languages' (p. 123). Here I attempt to do so, at least as far as the Kimberley region is concerned. I examine several lines of evidence that affect a conclusion as to whether *Z. bruijnii* occurs or occurred in the Kimberley.

Results and discussion

Aboriginal knowledge and oral history

Soon after the publication of the paper by Helgen *et al*. (2012) I contacted several Kimberley-region Aboriginal ranger coordinators and requested them to ask old Aboriginal people whether they knew of *Zaglossus*. I emailed them photographs of *Zaglossus bruijnii* and *Tachyglossus aculeatus* to show to their informants. Not all replied, but the several coordinators who did told me that the old people they had spoken to did not know *Zaglossus*, stating that only one type of echidna lived in their country. In particular, Nykina-Mangala people, whose traditional lands encompass Mt Anderson, stated unequivocally that *Zaglossus* was not part of their traditional knowledge. I also spoke to a very knowledgeable Wunambal man, the late Sylvester Mangolamara, together with other Wunambal and Gaambera people, at Truscott in August 2014 and all affirmed that they knew of only one type of echidna.

In 1988 my colleague Phillip Fuller and I spent two weeks in Kimberley rainforest patches at Mitchell Plateau and Prince Frederick Harbour with the late Geoffrey Mangolamara, Sylvester's father. Geoffrey was very knowledgeable about the animals of his country and was very willing to share his knowledge. Among names of animals that he gave us was a name for *Thylacinus cynocephalus* – this was volunteered and not in response to a question from us – and he made it clear that it had not occurred in his country for many generations. This name is reported in Mangglamarra *et al*. (1991) (note the different orthography used to spell the name) and in a book on Wunambal–Gaambera language (Karadada *et al*. 2011). Geoffrey didn't communicate anything about a second species of echidna, but we didn't ask. Geoffrey also told us there were two kinds of *Dasyurus* in his country, *D. hallucatus* and a much larger species that lives in uplands, Wunambal name 'daada'. This has since been corroborated by other elderly Aboriginal people (Karadada *et al*. 2011). I have concluded that this is likely to be *Dasyurus geoffroii*, noting its known former distribution in semiarid and arid Australia up to the southern edge of the Kimberley (Burbidge *et al*. 1988) and the occurrence of the sister species *D. spartacus* in New Guinea.

Oral traditional knowledge in the Kimberley, as in many other parts of Australia, remains strong and traditional oral knowledge even includes information on times when the sea level was lower than currently and islands off the coast were joined to the mainland (Reid *et al*. 2014), showing how knowledge is passed down though many generations. Ziembicki *et al*. (2013) report information on Aboriginal knowledge of mammals across northern Australia and did not report anything about *Zaglossus*.

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Zaglossus spp. are widely hunted for food in New Guinea and had *Z. bruijnii* occurred in Australia it would also have been avidly hunted, so the lack of oral history among Kimberley people is striking. Adult *Zaglossus* and *Tachyglossus* are markedly different in size and appearance: the average body length *of Z. bruijnii* is 45–77.5 cm and body weight is 5–16.5 kg (http://eol.org/pages/323860/details#morphology) while *T. aculeatus* has head–body length of 30–45 cm (Augee 2008) and a body weight of 2–7 kg. *Zaglossus bartoni*, which is closely related to *Z. bruijnii*, weighs 4.2–9.0 kg and has a body length of 48–64 cm plus a 10.1–14.2-cm snout (i.e. a head–body length of 58–78 cm) (Opiang 2009). The body proportions of *Zaglossus* spp. and *Tachyglossus* also differ, with *Z. bruijnii* having notably larger, more robust and longer legs as well as the longer, down-curved beak. While Kimberley Aboriginal people do not have different names for the similarly sized and proportioned *Petrogale burbidgei* and *P. concinna* (although some recognise them as different), they do for all other medium-sized and large mammals, e.g. Karadada *et al*. (2011). I have no doubt that had *Zaglossus* occurred in the Kimberley in modern times, it would have been well known and have had a unique (for each language group) name or names.

Helgen *et al*. (2012) state that a Miriwoong Gadjerong (east Kimberley) woman in her fifties reported that her grandmothers used to hunt an echidna larger than *Tachyglossus aculeatus* and that this was corroborated by the informant's mother when shown an outline illustration of *Zaglossus*. This information is inconsistent with the information that has been provided to me.

Rock art depictions

Helgen *et al*. (2012) stated 'The Late Quaternary occurrence of Long-beaked echidnas in northern Australia is widely accepted on the basis of a compelling Aboriginal rock art illustration (fig. 2), from an undisclosed Arnhem Land locality, that accurately depicts *Zaglossus* (Murray and Chaloupka 1984)' (p. 122). While some authors have made this claim, it is by no means 'widely accepted' that *Zaglossus* is depicted in rock art in northern Australia, with Lewis (1986, 2017) arguing, as did earlier authors, that there is no strong evidence that any megafauna species, including *Zaglossus*, is shown in rock art. On the other hand, depictions of *Thylacinus cynocephalus*, absent for several thousand years, are relatively abundant. This would be consistent with the likely mid-Holocene age of these paintings. Helgen *et al*. (2012) also state 'We also note with interest that compelling rock art images of the large, extinct carnivorous marsupial *Thylacoleo* have also recently come to light in the Kimberley (Akerman 2009, Akerman and Willing 2009). These discoveries point to the importance of rock art as a source of information about the past distributions in time and space of animals in northern Australian contexts' (p. 124). The identification of these rock art images is also disputed by Lewis (2017). People with long-term experience in researching Kimberley rock art have advised me that they have seen no images that could be of *Zaglossus*. Peter Veth, Professor of Australian Archaeology, The University of Western Australia, advised that 'there is no unequivocal depiction of megafauna in Aboriginal art. Though plausible representations have been countenanced, taxonomic and morphological analysis and sometimes dating has seen them rejected' and 'I have surveyed many parts of the Kimberley since 1980, and with colleagues and students, have now been able to access/review several large legacy rock art collections, from Grahame Walsh, Schmiechen, Donaldson, Scott-Virtue and others. I am not aware of any convincing *Zaglossus bruijnii* depictions in these Kimberley sources' (pers. comm.). Kim Doohan, Mintupela Pty Ltd, who has worked extensively with native title owners surveying rock art in the Kimberley has advised me that they have not seen any paintings in the north-west Kimberley that look like *Zaglossus* (pers. comm.).

The locality

Mount Anderson (the hill and the pastoral station) is located adjacent to the flood plain of the Fitzroy River. The station homestead (18.013°S, 124.011°E) has a mean annual rainfall of 537 mm (Bureau of Meteorology station no. 3016, opened 1899, closed 1986). It is situated in the Fitzroy Trough subregion of the Dampierland Interim Bioregionalisation for Australia (IBRA) Bioregion and is only 16.5 km from the boundary of the sandplain and dune Pindanland subregion. If *Zaglossus* occurred at Mt Anderson it is probable that it would have occurred in higher-rainfall areas further north in the Kimberley in areas where rainfall exceeds 1000 mm, especially noting its (and its congener *Z. bartoni*'s) primary diet in New Guinea of earthworms (Flannery 1995; Opiang 2009) and a variety of soil- and log-dwelling arthropods (Nicol 2015), dietary items more abundant in higher-rainfall areas, especially rainforest patches (McKenzie and Dyne 1991). However, despite major biological surveys and ongoing work in the north-west Kimberley since the 1970s, including a detailed examination of Kimberley rainforests (McKenzie *et al*. 1991), it has not been detected.

Identification of Tunney's specimen in Australia

Helgen *et al*. (2012) present strong evidence concerning the author of the label and there is no doubt that the label on the *Zaglossus* specimen is in Tunney's handwriting and consistent with other specimens he collected in northern Australia. The number on the field label and on a separate label (347) is identified in a Western Australian Museum catalogue of specimens sent to Walter Rothschild, dated 2 August 1901, as *Echidna aculeata*: Helgen *et al*. 2012, p.116). Before Tunney's collections were sent to Tring, experienced field collector Otto Lipfert and Director of the WA Museum Bernard Woodward would have seen the specimen but never identified it as *Zaglossus*. I find it difficult to accept that they would have misidentified the specimen, noting the significant differences from *Tachyglossus*. Unfortunately, Tunney's field note books have been destroyed (Ron Johnstone, Western Australian Museum, pers. comm.) so it's not possible to clarify field details of the collection, but it is clear that Tunney did collect an echidna at Mt Anderson. He didn't identify to species on his label; however, the specimen was identified as '*Echidna aculeata*' in Perth before being shipped to the United Kingdom.

Lack of records on other parts of northern Australia

As argued above, the diet and habitat of *Zaglossus* spp. in New Guinea suggest a predominantly earthworm diet in a largely

high-rainfall distribution. The 'Top End' of the Northern Territory and north Queensland have both been extensively searched for mammals and there are no records of *Zaglossus*, nor is there any published Aboriginal oral history of its occurrence. Even if its range in Australia included more arid areas similar to Mt Anderson, these too have been extensively searched and in some areas Aboriginal oral history of mammals researched and recorded. Dr Ian Abbott has pointed out to me that Knut Dahl (Dahl 1926) reported seeing Aboriginal people with a very large echidna near Mary River, Northern Territory (p. 203) (see Abbott 2016). I contacted the Oslo Museum asking if there was such a specimen in their collections. The reply was 'Thank you for your question about *Zaglossus*. I have searched our electronic database and cannot find any specimen of that species. I include a list of what we have from Knut Dahl collected in Mary River' (Øystein Wiig, Professor in Mammalogy, Dr philos., Head of Mammal Collection, Natural History Museum, University of Oslo, pers. comm.). The Mary River list includes a specimen of *Tachyglossus aculeatus*.

The specimen

Dr Helgen has advised me that he and colleagues are conducting further research into the specimen to attempt to clarify its origins.

A label switch?

Helgen *et al*. (2012) argue that the tags were not transferred from another specimen. They stated '. . . the only conceivable mix-up could involve a *Tachyglossus* specimen collected by Tunney, with tags that became disassociated from the original specimen, and later erroneously attached to a specimen of *Zaglossus bruijnii* that came from New Guinea' (p. 115), but presented reasons why they considered that this was unlikely. They also discussed a third tag on the *Z. bruijnii* specimen on which is written 'other label apparently does not belong to this specimen' and discount its importance (p. 114). They reported that 'Oldfield Thomas, arguably the greatest mammalogical taxonomist of all time, examined Tunney's specimens when they arrived in England, and made notes that indicate he understood Tunney's specimen was a Kimberley *Zaglossus*' (pp. 109–110). Helgen *et al*. (2012) concluded 'In summary, it is highly implausible to envision a switch-up in Perth or in Tring that could explain how tags from an Australian *Tachyglossus* specimen would have become mistakenly associated with a specimen of *Zaglossus* that originated from New Guinea' (p. 117). Thus, in my view, if a label switch happened, which I consider probable, it occurred after it left the Western Australian Museum, in transit, or, most likely, in the United Kingdom before it was examined by Oldfield Thomas.

Conclusion

There are several lines of evidence that strongly support a hypothesis that *Zaglossus bruijnii* did not occur in the Kimberley region of Western Australia in modern times. The strongest evidence is the lack of Aboriginal oral history or current knowledge of its occurrence. I suggest that the most plausible explanation is that the label was transferred from a Tunney specimen (it is reasonably clear that Tunney did collect an echidna at Mt Anderson) to a *Zaglossus* specimen from New Guinea, probably sometime after Tunney's *Tachyglossus* specimen left Australia and before it was examined by Oldfield Thomas at Walter Rothschild's private museum at Tring. I consider that the probability of *Z. bruijnii* being part of the modern mammal fauna of the Kimberley is very low.

Conflict of interest

The author declares no conflicts of interest.

Acknowledgements

I am grateful to Ian Abbott, Norman McKenzie, Peter Veth and John Woinarski, who provided comments on a draft of this paper. Discussions with Kristofer Helgen about the *Zaglossus* specimen were most helpful.

References

Abbott, I. (2016). Foreword and Appendix to the Explorers' Diaries Project Edition of 'In Savage Australia' by Knut Dahl. pp. 327–332. (Hesperion Press: Perth.)

Akerman, K. (2009) Interaction between humans and megafauna depicted in Australian rock art? *Antiquity* **83**(322). http://www.antiquity.ac.uk/projgall/akerman322/ (accessed 12 December 2017).

Akerman, K., Willing, T. (2009) An ancient rock painting of a marsupial lion, *Thylacaleo carnifex*, from the Kimberley, Western Australia. *Antiquity* **83**(319). http://www.antiquity.ac.uk/projgall/akerman319/ (accessed 12 December 2017).

Augee, M. L. (2008). Short-beaked echinda *Tachyglossus aculeatus*. In 'The Mammals of Australia'. (Eds S. M. Van Dyck and R. Strahan.) pp. 37–39. (Reed New Holland: Sydney.)

Burbidge, A. A., Johnson, K. J., Fuller, P. J., and Southgate, R. I. (1988). Aboriginal knowledge of the mammals of the central deserts of Australia. *Australian Wildlife Research* **15**, 9–39. doi:10.1071/WR9880009

Dahl, K. (1926) 'In Savage Australia. An Account of a Hunting and Collecting Expedition to Arnhem Land and Dampier Land.' (Philip Allan and Co: London.)

Flannery, T. F. (1995) 'Mammals of New Guinea.' (Reed Books: Sydney.)

Helgen, K. M., Miguez, R. P., James, L. K., and Lauren, E. H. (2012). Twentieth century occurrence of the long-beaked echidna *Zaglossus bruijnii* in the Kimberley region of Australia. *ZooKeys* **255**, 103–132. doi:10.3897/zookeys.255.3774

Karadada, J., Karadada, L., Goonack, W., Mangolamara, G., Bunjuck, W., Karadada, L., Djanghara, B., Mangolamara, S., Oobagooma, J., Charles, A., Williams, D., Karadada, R., Saunders, T., and Wightman, G. (2011) 'Uunguu Plants and Animals.' (Wunambal Gaambera Aboriginal Corporation and Department of Natural Resources, Environment, The Arts and Sport: Kalumburu.)

Lewis, D. (1986). 'The Dreamtime Animals': a reply. *Archaeology in Oceania* **21**, 140–145. doi:10.1002/j.1834-4453.1986.tb00135.x

Lewis, D. (2017). Megafauna identification for dummies: Arnhem Land and Kimberley 'megafauna' paintings. *Rock Art Research: The Journal of the Australian Rock Art Research Association (AURA)* **34**, 82–89.

Mangglamarra, G., Burbidge, A. A., and Fuller, P. J. (1991). Wunambal words for rainforest and other Kimberley plants and animals. In 'Kimberley Rainforests of Australia'. (Eds N. L. McKenzie, R. B. Johnston, and P. G. Kendrick.) pp. 413–421. (Surrey Beatty: Sydney.)

McKenzie, N. L., and Dyne, G. E. (1991). Earthworms of rainforest soils in the Kimberley, WA. In 'Kimberley Rainforests of Australia'. (Eds N. L. McKenzie, R. B. Johnston, and P. K. Kendrick.) pp. 133–145. (Surrey Beatty: Sydney.)

McKenzie, N., Johnston, R., and Kendrick, P. (Eds) (1991). 'Kimberley Rainforests of Australia.' (Surrey Beatty: Sydney.)

Murray, P., and Chaloupka, G. (1984). The dreamtime animals: extinct megafauna in Arnhem Land rock art. *Archaeology in Oceania* **19**, 105–116.

Nicol, S. (2015). Family Tachyglossidae (echidnas). In 'Handbook of the Mammals of the World'. (Eds D. Wilson and R. Mittermeier.) pp. 34–57. (Lynx Editions: Barcelona.)

Opiang, M. D. (2009). Home ranges, movement, and den use in long-beaked echidnas, *Zaglossus bartoni*, from Papua New Guinea. *Journal of Mammalogy* **90**, 340–346. doi:10.1644/08-MAMM-A-108.1

Reid, N., Nunn, R. N., and Sharpe, P. (2014). Indigenous Australian stories and sea level rise. In 'Proceedings of the 18th Conference of the Foundation for Endangered Languages'. (Eds P. Heinrich and N. Ostler.) pp. 82–88.

Woinarski, J. C. Z., Burbidge, A. A., and Harrison, P. L. (2014) 'The Action Plan for Australian Mammals 2012.' (CSIRO Publishing: Melbourne.)

Ziembicki, M. R., Woinarski, J. C. Z., and Mackey, B. (2013). Evaluating the status of species using Indigenous knowledge: novel evidence for major native mammal declines in northern Australia. *Biological Conservation* **157**, 78–92. doi:10.1016/j.biocon.2012.07.004